

More Energy from Hydro

Unlocking the Value

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Imagine a manager of hydro generation listening to the power marketers explain how they keep the hydro generating unit portion of their power portfolio intentionally in reserve. The marketers characterize this as a wise or prudent measure in anticipation of an unexpected power demand swing. They might also explain another scenario where they would use the hydro units to satisfy the minute-by-minute variations in grid demand. Why would they do this? Because hydro units have the unique ability to satisfy rapid response demands for power, and the marketers find that an extremely attractive portfolio management tool.

The hydro generation manager then relates his frustration because he wants his units generating power as much as possible to, of course, generate revenues. Unfortunately, his units are being “positioned” as a safety valve or precautionary generating asset to fill the bill should an unexpected demand become a reality. Worse yet, his hydro assets are not even being paid for this positioning as an ancillary service.

Such is one reality of this journey we’ve come to know as the deregulation of the energy generation industry. Hydro generating units will undoubtedly be recognized for their value, but we’re not there yet. Those deregulating laggards worldwide may have a strategic advantage as a result. They can avoid these learning curve events just by not repeating mistakes made by the early adopters. Will they benefit from this? We’re not sure. The point though is this. Hydro generating units are strategically well positioned to be a part of every marketer’s energy portfolio because of their innate ability to rapidly respond to a marketer’s demands. The consequence of these strategic advantages, though, is that they are experiencing operating demands they’ve likely never seen before, let alone been designed for. As a result,



hydro turbine and generator problems are becoming more common and some of these problems have not been seen before.

A generating asset had a potential of being profitable a maximum of 30 days out of the entire 1999 calendar year. This was a consensus number frequently quoted last year at major gatherings on deregulation. The inferred cause of this limited profit opportunity was of course the impact of competition driving power rates down; periods of high demand being the only opportunities for profit. Communicated in different terms, this year a number frequently quoted suggests that only 80 hours out of an entire year are available with sufficiently high power prices for a generating asset to recoup its fixed costs. Many hydro

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operators might chuckle with delight knowing their fixed costs are already paid for, but re-licensing realities might complicate that assumption. What is a reality is that a generating unit had better be available to generate at the right times in order that these profit opportunities be grasped. Assessing a unit's ability to be available, or its reliability, hinges on a thorough assessment of its condition.

Hydro Generator Condition Assessment

An accurate assessment of a hydro generator's condition is dependent not only on its rotor dynamics but also select characteristics of its generator. Coupled with both of these is the need to incorporate machine critical



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process parameters with the unit measurements to understand their impact on the rotor dynamics and generator condition. Enter Bently Nevada's complete solution for hydro unit health management, the full turbine generator management solution that includes HydroScan® technology for generator condition assessment, traditional vibration monitoring for mechanical condition assessment, and a Decision Support™ backbone that incorporates Actionable Information™ for effective unit condition management and reliability assessment. Incorporated in the HydroScan technology are generator air gap, flux and partial discharge measuring functions, all supported with corroborating information from the stator core temperature circumferential map.

Online management of the hydro unit has two major benefits. First, the continuous accurate condition assessment enables orderly planning of unit maintenance and serves as a reliable source of information for determining what maintenance is required. This has a longer-term machine management benefit. From a short-term perspective, the machine management tool serves two specific functions, both associated with the assessment of a unit's ability to respond to a load demand. First is the simple ability to make a statement regarding a unit's availability. In the energy planning/scheduling process, the availability status of a unit is identified and used in communicating the risk associated with that asset's ability to meet an obligation. Financial and operational contingency plans are

then defined, based on that risk assessment. Second is the online capability of the tool to advise minute-by-minute status of a unit in maintaining its commitment, and should that ability come into question, the tool can assess the severity of the situation and provide Decision Support™ in implementing those established contingency plans. That support can even include plant-specific or unit-specific procedures to eliminate the need for an unscheduled forced outage. Ultimately this capability enables documenting corporate learning, providing an avenue for continuous improvement of availability.

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Learning curve exceptions set aside, if present trends continue, the ability to make a profit in the competitive world of power generation deregulation will become more difficult. The ability to take advantage of attractive power pricing conditions will be a minimum requirement for profitable success, maybe even financial existence. Automated online assessment of that ability will be a necessary tool in managing the numerous risk aspects associated with responding to energy demand – knowledge of a unit's condition will be a primary source for this assessment. [↻](#)